

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MICROSOFT CORPORATION,
Petitioner,

v.

REALD SPARK, LLC,
Patent Owner.

IPR2023-01046
Patent 10,740,985 B2

Held: September 20, 2024

Before: JEAN R. HOMERE, CHARLES J. BOUDREAU, and
CHRISTOPHER L. OGDEN, *Administrative Patent Judges*.

IPR2023-01046
Patent 10,740,985 B2

APPEARANCES:

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The above-entitled matter came on for hearing on September 20, 2024, commencing at 1:00 p.m., via video teleconference.

P R O C E E D I N G S

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JUDGE HOMERE: All right. Well, good afternoon. We are convened for oral arguments in IPR2023-01046 which challenges the patentability of Claims 1 through 14, and Claims 16 through 19 of U.S. Patent Number 10,740,985. Petitioner is Microsoft Corporation, and the Patent Owner is RealD Spark, LLC. I am Judge Homere, and also appearing are Judge Boudreau and Judge Ogden.

Let's get started with appearances of the representatives, who will be arguing today for both parties. If anyone else is attending remotely with you today but will not be speaking, please identify them as well. For example, if -- state if your client is attending. We will start with appearances for Petitioner.

MR. STEIN: Yeah, good afternoon or good morning, Your Honors. This is Alex Stein. I'm here today on behalf of the Petitioner, Microsoft Corporation. And with me on the line, but he will not be speaking is Matt Walker, who's also here. On behalf of Microsoft, our client is not on the line. And I could have one other colleague that's on the public line, although I'm not sure. But if he is, that's Andrew Devkar, also representing the Petitioner, Microsoft, but he won't be speaking either.

JUDGE HOMERE: And now, Patent Owner.

MS. MAURI: Good morning, Your Honors. Jennifer Mauri from Michelman & Robinson on behalf of Patent Owner, RealD Spark, LLC. Joining me on the line today should be Timothy Gorry, also from Michelman & Robinson. I do not anticipate that he will be speaking. And

1 then on the public line I may have another colleague at my firm, Aaron
2 Plesset, who may be listening in, he will not be arguing. And finally,
3 another attorney representing RealD Spark, although not from my firm, is a
4 gentleman named Neil Mothew. He is also listening on the public line.

5 JUDGE HOMERE: Okay, great. Thank you for that. Before we
6 begin, I would like to remind the parties that guidance for this hearing was
7 provided in the oral hearing order of August 15, 2024, paper 22. As set forth
8 in our August 15 oral hearing order, each side has been given up to 60
9 minutes total time for oral arguments. Petitioner will proceed first to present
10 its case as to the challenged claims of the challenged patent. Petitioner may
11 reserve time for rebuttal. Thereafter, Patent Owner will argue its opposition
12 to Petitioner's case. Patent Owner may also reserve time for a sur-rebuttal.
13 Absent present circumstances, Petitioner may reserve no more than half its
14 time for rebuttal, and Patent Owner may reserve no more than half its time
15 for sur-rebuttal.

16 We remind the parties that Petitioner has the ultimate burden of
17 establishing unpatentability by a preponderance of the evidence.
18 Additionally, we will provide the following reminders. First, no recording
19 of any kind during PTAB's hearing is allowed. The court reporter will
20 provide in due course a full transcript of the hearing that will become part of
21 the record in the proceeding. To ensure that the transcript of this hearing is
22 clear, we ask that you identify yourselves before speaking and to speak
23 directly into the microphone and to identify specific slide numbers,
24 numbering in figures, and any other pertinent identifying information when
25 referring to demonstratives.

1 Please also pause a few seconds after identifying it to provide us
2 the time to find it. Please mute yourself when not speaking. If at any time
3 during this proceeding you encounter any technical or other difficulties that
4 you feel fundamentally undermine your ability to adequately represent the
5 client, please let us know immediately, for example, by contacting the team
6 members who provided you with the connection information.

7 Second, we have reviewed the entire record, including
8 demonstratives, and we are prepared today with questions. Questions and
9 their answers will help us to decide the issues in the case. In the interest of
10 fairness and due process, we must limit our consideration to arguments and
11 evidence already presented in the record. Please know that we are paying
12 close attention to your arguments in carefully considering the case. And if
13 we interrupt you, I apologize in advance. We do so to be able to ask you
14 questions that may be essential to a resolution of the issues, but to keep the
15 hearing on track with time.

16 Third, please make clear -- make it clear with challenges and the
17 claim you are addressing at all times. We ask that the parties hold any
18 objection regarding the parties' arguments until it is time to speak. I will
19 maintain a clock and endeavor to give each party a time warning as you near
20 the end of your allotted opening arguments, and near the end of any reserve
21 time for rebuttal. It would be helpful for the parties to also track their time.

22 Finally, please be aware that members of the public may be
23 listening to this oral hearing. While on the hearing, please confer with the
24 court reporter to ensure that no questions regarding the spelling of the names
25 are required.

1 Petitioner, do you wish to reserve any rebuttal time?

2 MR. STEIN: Thank you, Your Honor, and thank you for those
3 reminders. Those are helpful. And yes, I would like to reserve 15 minutes
4 of my argument for rebuttal, please.

5 JUDGE HOMERE: Great. So, your presentation will be 45
6 minutes.

7 MR. STEIN: Yeah, that's what I'll shoot for. Thank you.

8 JUDGE HOMERE: Right now, it's 1:08. All right. So, you may
9 begin when you are ready.

10 MR. STEIN: Yeah. Okay. Thank you, Your Honors. Thank you
11 for holding this hearing today. As mentioned earlier, I'm Alex Stein from
12 the law firm of Morgan, Lewis, and it's my honor and privilege today to
13 present this case on behalf of the Petitioner, Microsoft.

14 Turning to my demonstratives, I'm going to start with slide number
15 2. And on slide number 2, I sort of have an overview of what I'll be
16 covering today. So, we'll start first with a very brief overview of the '985
17 patent, and I'll try to keep that as brief as possible. Next, we'll talk about the
18 Ganin reference, and I'll be explaining as quickly as I can the way that the
19 arguments as they've been presented by Patent Owner, essentially imagine
20 claim requirements that just aren't in existence. And that's why once those
21 are dismissed, the Ganin reference remains invalidating.

22 The next thing I'll talk about is Ground 3, which is an obviousness
23 combination based on the Chalom and the Aslan reference. For this
24 particular part of my presentation, I'll be focusing on the motivation and the
25 existence of a reasonable expectation of success. As we'll see as we go

1 through the argument, patent owner has certain points concerning alternative
2 options, but the case law does not require there be a perfect solution here.
3 And I'll talk about why a motivation and a reasonable expectation of success
4 exists and nothing more is legally required. And the next thing I'll do is I'll
5 do a brief conclusion and hopefully I'll have 15 minutes left for rebuttal.

6 Turning ahead to slide 4, please. And sorry, can I pause for one
7 second? I'm hearing an echo from somebody. I'm sorry to pause my
8 presentation, but it's -- it is bothering me just a little bit. I don't know if
9 somebody's not muted or. I can keep going, but it is -- I'm just hearing my
10 voice come back from somebody else's microphone. Okay, anyways, I'll go
11 back on now.

12 Okay, so turning to slide 4. I'll talk about an overview of the
13 patent. So, what we have on this slide here on the upper right-hand corner,
14 you'll see there's an image of a gentleman near a monitor. You'll see two
15 lines there. There's a line 15 and line 16. So, line 15 would sort of show
16 you what it looks like when the user is looking at the screen. And line 16
17 shows you where their gaze is directed, were they to be looking at the
18 camera. In this particular patent and the claims that we'll talk about, and
19 also in the prior art, there is a goal of trying to correct the gaze so that even
20 if you're looking at the screen where that line 15 is pointing in Figure 1 of
21 the patent, what you can do is you can use machine learning to manipulate
22 the eye gaze direction so that it appears like the user is actually looking on
23 that line 16 so they're making eye contact as you normally would if you were
24 face to face with someone. So, that's sort of the objective here, both in the
25 patent and in the prior art.

1 Now, I'm going to jump ahead to slide 6 please. This slide
2 highlights some of the aspects of Claim 1 in the '985 patent, and these are
3 not disputed. So, I'm going to be using the prior art to explain some of these
4 aspects. So, what you'll see on the left-hand side of the claim is the way that
5 the training of these machine learning algorithms can make use of input
6 patches and output patches. You'll see with that green arrow, an example of
7 this is very nicely depicted in the Ganin reference. At the top, you'll see as I
8 was talking about with reference to Figure 1 of the patent, the user's eyes,
9 they are sort of offset from where they would be if they were making eye
10 contact with somebody else. In blue, beneath those, and those are paired up,
11 so the inputs are in green, the outputs are in blue, you can see a correction to
12 the pupil to try to ensure that eye contact can be maintained. So, that's the
13 basic premise in terms of how the training occurs. You feed these inputs,
14 you feed the outputs, and the machine learning algorithms that are able to
15 learn how to perform the eye gaze correction.

16 Turning next to slide 7, what is disputed? So, if we look at slide 7
17 here, you'll see there's two primary elements that I'll be talking through in a
18 moment. So, 1[D] and 1[E]. In 1[D], you have using a first machine
19 learning algorithm to generate first reference data using the training data.
20 Again, those input patches and output patches that I talked about on slide 6.
21 And in 1[E], you make use of the second machine learning algorithm to
22 generate second reference data using the same training data and the first
23 reference data. And I'm going to talk through this in detail as I go through
24 the materials here. But essentially, you use those input patches and output
25 patches. You take an output from the first machine learning algorithm and

1 then you use that to produce a more compact second machine learning
2 algorithm.

3 Turning next to slide 8. Each of these elements that I just
4 described is not purported to be something novel and the patent itself
5 confirms this. If you look on this slide, you'll see there's a few snippets from
6 the patent there. Exhibit 1001, column 16, lines 24 to 37. Is the first
7 machine learning algorithm something foundational, something new? No,
8 it's not. The patent tells you the first machine learning algorithm may be any
9 of these known types. It can be a neural network. It can be a support vector
10 network. It can be a generative adversarial network. This is nothing new.
11 It's a common algorithm and the patent admits that. Slide 8, the second
12 snippet there, Exhibit 1001, column 16, lines 24 to 44. The same is true for
13 the second machine learning algorithm. This is nothing new. It's left to
14 common implementations and the patent lists a few of them. A regression
15 forest, regression ferns, and a few others that line up very closely with the
16 prior art.

17 The next snippet there are these editing instructions. Are they
18 something that the patent purports to imbue with some novelty? No, it does
19 not. Exhibit 1001, column 18, lines 21 to 24, the patent explains, editing
20 instructions herein is understood to encompass any data which may be used
21 to define how a digital representation of a head region should be adjusted.
22 So again, nothing magical here is making use of any known data to serve
23 this purpose. And again --

24 JUDGE OGDEN: Mr. Stein?

25 MR. STEIN: Yes.

1 JUDGE OGDEN: This is Judge Ogden. I just had a question
2 about the first two of these quotes here on slide 8. They say that the first
3 machine learning algorithm, then in the second machine algorithm may
4 comprise a neural network. Can they just be a neural network? Do they --
5 would they -- in the case where you're talking about as a neural network,
6 would the machine learning algorithm be the neural network? Or would it
7 be the neural network and some additional software to, for example, train the
8 neural network or otherwise implement the neural network?

9 MR. STEIN: Yeah. So, in view of the way the claims are written,
10 my answer would be that the algorithm would be the network itself. And
11 then some of the additional software that would be used for other purposes
12 would be something else. But the network, and it could be that you have
13 multiple types of machine learning algorithm in that. So, you could have a
14 neural network and a support vector machine, or you could have a regression
15 forest and some other -- so, you could have different types in there as well,
16 but the algorithm itself would be the network.

17 JUDGE OGDEN: So, what do you mean by that then would be the
18 machine learning algorithm would be the neural network as it's defined, say,
19 in TensorFlow or whatever a person of ordinary skill in the art would have
20 been using at the time to define the various layers of a neural network. It
21 would be that as opposed to ancillary software that would be used in the
22 process of training the neural network?

23 MR. STEIN: I believe that's an accurate summation there, yes.

24 JUDGE OGDEN: Okay. Thank you.

25 MR. STEIN: Sure. Continuing, so slide 8, one other point I

1 wanted to make here regards the training data. So, this is an admission from
2 Patent Owner's expert, Dr. Eli Saber, which is an important one when I'll get
3 to the prior art in a moment. But the patent does say that you use the same
4 training data. What it does not specify, it does not specify the form of that
5 training data, and it does not specify how you use that training data. Those
6 are left to implementation details. They're not requirements of the claim.
7 And that will be important when I talk about the prior art in a minute.

8 Now I'm going to start talking about the grounds based on Ganin.
9 So, if Your Honors could please turn to slide 11, I'll start there. And I
10 apologize, that slide is missing a number. But it is the slide immediately
11 after slide 10, which is the section break slide that just says Ground 1:
12 Ganin. So, on slide 11 here, this is the Ganin reference. The Ganin
13 reference is a paper called Deep Warp: Photo Realistic Image Resynthesis
14 for Gaze Manipulation right on point for the same thing that the patent is
15 doing. And if you look here in the bottom right corner of 10(a), you'll see
16 one of the main figures in Ganin as well, which is Figure 10(a), and this is in
17 Exhibit 1006.

18 And just to be clear for Your Honors too, there is -- we had a
19 discussion during the case, there's a corrected version of Ganin. So, I just
20 want to make sure, when I'm referring to 1006, it's the corrected version that
21 was filed on March 4th, 2024. That's the version that I'm hoping Your
22 Honors are referencing.

23 So, on slide 11, you'll see, we have a depiction of the high-level
24 pipeline here for Ganin. And at a high level, you'll see starting from the left,
25 you have an input box, that input box passes through a concatenator. That

1 training data then goes to that green box, which is the first machine learning
2 algorithm. And it also passes to the blue box, which is the second machine
3 learning algorithm. And you'll also see at the bottom, annotated in the red
4 text, is an output of that first machine learning algorithm, the half scale
5 network is the course flow. So, in addition to the input data, you also have
6 the course flow that separately is provided to the second machine learning
7 algorithm.

8 JUDGE OGDEN: So, Mr. Stein --

9 MR. STEIN: Yeah. Yep.

10 JUDGE OGDEN: Your position is then that it's exactly the same
11 training data that goes to MLA1 and MLA2, right? Except that, in the case
12 of MLA2, it's concatenated with the results of the MLA1.

13 MR. STEIN: That's correct. There's a -- yeah, there's a
14 concatenating operation that occurs. And I think it's useful if you go to
15 Ganin, Exhibit 1006, and you look at page 4, I'm referring to the numbered
16 stamp in the lower right corner. So, Exhibit 1006, corrected version on page
17 4. Figure 2 there, you'll see in the upper left corner, it has a depiction of
18 what this concatenation looks like. So, you'll see the image, the anchors,
19 and the angle. Those get concatenated together. So, the training data is still
20 there. It's just concatenated with other information. So, yes, that same
21 training data is provided to both of the two algorithms.

22 So, continuing here with slide -- or actually focusing on Exhibit
23 1006, I'd also like Your Honors to take a look at page 18. That's the number
24 in the lower right corner of Exhibit 1006. And another thing you'll see is
25 that each of these two modules, the pipelines are depicted on this page. So,

1 see in the middle there--

2 JUDGE HOMERE: Counselor, this is Judge Homere. I think I
3 must be working with the wrong version in here because the version that I
4 have here, it's Exhibit 1006.

5 MR. STEIN: Yeah, that's what --

6 JUDGE HOMERE: It goes only up to page 16.

7 MR. STEIN: Yeah, that's what I wanted to be careful about. So,
8 during the case, we had sent Your Honors an email that we were going to
9 substitute in a corrected version that was undisputed by Patent Owner, and
10 that's been filed. So, the only version that should be referenced is the one
11 that we filed as a corrected version of Exhibit 1006, and it was filed on
12 March 4th, 2024. So, if you could please find that one, that's the only one
13 that should be referenced, and that has the correct paging.

14 JUDGE HOMERE: Okay. I see it now. Okay.

15 MR. STEIN: Yeah. Thank you. And I thought that might come
16 up, so thank you for flagging that. I didn't want you to look at the wrong
17 thing. Okay. So, turning back to Exhibit 1006, the corrected version, you'll
18 see on page 18, there's the first machine learning algorithm, the half-scale
19 processing module, and there's the full-scale processing module in 10(c). At
20 the bottom there are the convolutional layers. So, both of these modules
21 have convolutional layers, which folks familiar with machine learning
22 algorithms, and as explained by our expert, well know that if you have
23 convolutional layers, you have a machine learning algorithm. And I'll go
24 through other details as well, but I just wanted to flag that at the beginning
25 there.

1 Turning next to slide 13, in the institution decision, Your Honors
2 had sort of posed a question about the forwarded reference data and whether
3 that's being relied on for two separate inputs. So, I wanted to take the
4 opportunity to explain that it is not. What we're doing is, as explained by
5 Dr. Karam, Microsoft's expert at Exhibit 1003 at paragraph 125, that this
6 fine warping module has two inputs. It has the input maps, and it has the
7 coarse warping field, which I showed a moment ago.

8 You'll also see on slide 14, this does not appear to be a contested
9 issue. During the deposition of Patent Owner's expert, Eli Saber, you'll see
10 that he was confronted with Figure 10(c) from the Ganin reference, and he
11 himself explained that the box you see annotated in purple, the box you see
12 annotated in light orange, those are two separate inputs. One is the training
13 data, and one is the coarse flow, which is the forwarded reference data. So,
14 two different things. And the petition in its reliance on Ganin was not
15 relying on one thing for the requirement of two separate disclosures. There's
16 two separate things.

17 Turning next to slide 15. What are Patent Owner's response to the
18 Ganin reference? And the response is, well, even though it shows two
19 modules, they don't think that a module is a machine learning algorithm, and
20 that just is not true. If you look on slide 15, there's sort of three pillars of
21 this position that I'll talk you through here. So first, they say that Ganin only
22 has one set of training data. That's true. And that's the same as the patent
23 claim. The patent claim, as we just talked about, has two machine learning
24 algorithms that get the same training data, exactly what Ganin does. They
25 also say that Ganin has one objective function. Again, that's not -- that's

1 immaterial because the claims, as you'll see reproduced on the bottom of
2 slide 15, don't have any requirements about an objective function. And
3 there's been no claim construction saying that the word machine learning
4 algorithm has some tie to a particular number or use of objective functions.
5 So, that argument is immaterial. Third, they have some answer --

6 JUDGE OGDEN: Mr. Stein?

7 MR. STEIN: Yeah.

8 JUDGE OGDEN: This is Judge Ogden again. Does the
9 challenged patent refer to objective functions?

10 MR. STEIN: It does not. Nowhere in the patent does it mention
11 objective functions.

12 JUDGE OGDEN: So presumably, if an objective function were to
13 come into play and, you know, as to how we interpret the claims, it would
14 have to come from just the background knowledge of somebody of skill in
15 the art?

16 MR. STEIN: I suppose, Your Honor. But I don't -- like I
17 mentioned a moment ago, there's been no claim construction briefing on this
18 particular term. And I'll get to it in a moment. But there was claim
19 construction briefing in the District Court case. And there was never any
20 argument that machine learning algorithm has any requirement related to
21 objective functions, either their number or their use.

22 JUDGE OGDEN: I'm wondering about where you have two
23 modules, or, you know, as you would call them, machine learning
24 algorithms. But whatever, you know, whatever we say they are, two
25 different neural networks in series. And does it make a difference in terms

1 of whether you can refer to each of them as a separate machine learning
2 algorithm if they're trained together end to end using the same criteria to
3 train the whole -- both of the neural networks together?

4 MR. STEIN: No, Your Honor. Our position is consistent with the
5 patent and the claims here that it does not matter. And it's not just us saying
6 that. So, I'll turn for a minute, but we have admissions from Patent Owner's
7 expert as well on that very point.

8 So, if you turn to slide 24, and this is from the deposition of Patent
9 Owner's expert at the top, Exhibit 1061 at page 14, lines 8 to 17, I asked
10 him, a skilled person in this field could have made use of one objective
11 function to train multiple algorithms? You could. Stop. End of discussion.
12 He's admitted that one objective function can train multiple algorithms.
13 There's nothing to prevent that fact. And again, it's also not just him, their
14 own expert, saying that. If you go to slide 25, the references and the
15 common knowledge at the time, that was what POSAs understood.

16 If you look at slide 25, this is the Aslan reference. It's undisputed
17 that this is prior art. This is part of a POSA's knowledge in this field. You
18 can see in paragraph 7 of Exhibit 1007, Aslan teaches, a process can include
19 generating an objective function that is to be used for jointly training a set of
20 machine learning models. So again, it's Patent Owner's expert. It's the
21 references themselves. Our expert has said it. There appears to be no
22 disagreement. One objective function can train multiple machine learning
23 algorithms. And again, that's not in the claims and it's no basis to
24 distinguish Ganin. Does that answer your question, Judge Ogden?

25 JUDGE OGDEN: Yes. Thank you.

1 MR. STEIN: Okay, good. So, I'm going to skip ahead a little bit.
2 So, I'm going to turn to slide 26. And I want to talk about this semantic
3 argument, which to us is tenuous at best and undermined when you look at
4 the Ganin reference closely enough as we need to here. So first, turning to
5 slide 27, if you read the briefs, you'll see that Patent Owner's position seems
6 to be supported by, you know, sort of wobbly knees where you're saying a
7 neural network, model, and architecture. Those can all be a machine
8 learning algorithm, but there's something strange, something unusual. The
9 term module just cannot be. And that just makes no sense because if you
10 look at the Ganin reference, Exhibit 1006, and you compare what's on page
11 4, which refers to lightness correction neural network, page 17 refers to the
12 exact same network, and calls it a module. There's no basis for using
13 semantics to try to distinguish these terms. Ganin itself is making clear that
14 a module could be a machine learning algorithm. It's not a basis to discredit
15 the two machine learning algorithms that Ganin so clearly has.

16 Turning next to slide 29, you'll see here that, and I believe Patent
17 Owner will probably make this position, but there are references to the
18 singular term architecture in the reference. Well, there are also references to
19 the plural form of that same word in the same reference. If you look at
20 Exhibit 1006 at page 17, you see that it says the architectures, and this is
21 reproduced on slide 29, the architectures, plural, of the two working
22 modules.

23 So again, the reference itself says that you can have plural
24 architectures. So, one architecture can have multiple modules, multiple
25 architectures can have multiple modules. These semantics just don't make

1 any sense in the context of the reference as a whole. The reference says
2 what it says, and it has two machine learning algorithms, and this semantic
3 position doesn't change that. And when I asked a Patent Owner's expert
4 about this very issue, you see on slide 29, I tried to ask him about this very
5 issue. I said that single feed-forward architecture can include multiple plural
6 architectures. Is that not what it's saying? And then he says, well, the
7 reference, he could have used better wording. So, he can't explain this away
8 either. He just says, well, discount those words, credit the words I want you
9 to look at. And that's not the way we interpret a reference, particularly on a
10 semantic position that is inconsistent with the reference as a whole.

11 So, continuing. Slide 30, I just want to pause for a moment. So, --

12 JUDGE HOMERE: Counselor?

13 MR. STEIN: Yes.

14 JUDGE HOMERE: Counselor, this is Judge Homere. Can you
15 point to where in the Ganin reference where it says that the coarse warping
16 module or the fine warping module can be a machine learning algorithm?
17 Because I see that refers to modules, but I didn't see any instance where
18 machine learning algorithm is a reference.

19 MR. STEIN: Yeah. So, it does not use those terms, but it does
20 show that and teach that to a skilled person. So, the first thing I would point
21 to is if you look at Exhibit 1006 at page 18, I was showing you a moment
22 ago that these are the pipelines for the machine learning algorithms in Ganin.
23 So, those modules, you'll see 10(b) and 10(c), there's a half-scale processing
24 module, a full-scale processing module. Both of those have convolutional
25 layers.

1 So, those are aspects of a machine learning algorithm. You have
2 convolutional layers in a machine learning algorithm. So, the fact that they
3 have convolutional layers teaches a POSA that this is a machine learning
4 algorithm.

5 And then, moreover, specifically on this term module, I think
6 it's important for Your Honors to appreciate the point I was making a
7 moment ago. So, I want to pause and just explain it more slowly. So, if you
8 look on page 4 of Exhibit 1006, at the top you'll see Figure 2. Figure 2 in
9 the upper right-hand corner has something called a lightness correction
10 neural network in that gray box. If you scroll back to the part of Ganin I was
11 showing a minute ago, slide -- page 18, Figure 11, you'll see that same thing
12 that Ganin calls a lightness correction neural network is called a lightness
13 correction module. So, the point I was making is that when Ganin uses the
14 term module he means a machine learning algorithm. That's consistent with
15 the way he refers to a lightness correction neural network as also a lightness
16 correction module. There's no basis to draw some distinction between those
17 terms. So, it's both in the structure of those modules and it's in the semantic
18 use of these terms within the reference itself. Does that answer your
19 question Judge Homere?

20 JUDGE HOMERE: Yes.

21 MR. STEIN: Okay, good.

22 JUDGE HOMERE: Thank you.

23 JUDGE BOUDREAU: Mr. Stein, this is Judge Boudreau. I
24 believe that Patent Owner argues that Petitioner brought up the lightness
25 correction neural network for the first time in its reply brief. And I'm

1 wondering, are you mapping the lightness correction neural network to any
2 limitation of the claim?

3 MR. STEIN: No, Your Honor, that was purely a responsive
4 position to their semantic argument. So, they argued that a module can't
5 refer to a machine learning algorithm. So, we're entitled per the Board's
6 regulations and Federal Circuit decisions to respond to that position. So,
7 we're merely using the lightness correction neural network, and it's also
8 being described as a module to make the argument that when Ganin refers to
9 a coarse warping module and a fine warping module consistent with the way
10 it interchangeably refers to a lightness correction neural network and a
11 lightness correction module, the same is true for the coarse and fine warping
12 module. So no, we're not mapping it to a limitation of the claim. We're just
13 using it to rebut a position presented by Patent Owner for the first time in its
14 response, and our only chance to respond was in our reply brief.

15 JUDGE BOUDREAU: Thank you for clarifying that. I do have a
16 follow up question. That's that Patent Owner also argues that Ganin really
17 only teaches a single algorithm that uses a two-step process, and that that's
18 not the same as having two machine learning algorithms. I'm wondering if
19 you could address that.

20 MR. STEIN: Yeah. That was -- so, when I was talking earlier
21 about the way that the Ganin system is architected, that was sort of my
22 addressing that particular position because that position is bolstered by the
23 fact that they're saying, well, you would need to have different training data,
24 or you would need to have different objective functions and then you would
25 have two machine learning algorithms. But the point is that none of that is

1 necessary. None of that is required by the claims. So, once those arguments
2 are eliminated, you're left with the conclusion that those are indeed two
3 machine learning algorithms. It doesn't matter that it's architected as a two-
4 step overall system or anything like that. It's joint training of two different
5 machine learning algorithms, which is known in this field to be the use of
6 two different algorithms. It doesn't change that conclusion.

7 And again, the way that those arguments were bolstered is on these
8 wobbly knees I was describing earlier that you somehow must have more
9 than one objective function, or you must have different training data. Again,
10 that's not what Ganin shows. So, once you eliminate those arguments, the
11 conclusion follows that these are indeed two machine learning algorithms.

12 Turning next to slide 31, the last point I'd like to make on Ganin is
13 with reference to European prosecution. So, this reference was also cited
14 against claims that are almost identical to the Claim 1 at issue here. And the
15 EPO, and I'd ask Your Honors to pull up Exhibit 1013 and have a look at
16 pages 226 to 227. So, on your question, Judge Boudreau, it's not just me, it's
17 not just our expert, it's not just the opinions that came out at deposition from
18 their expert, it's also the European Patent Office and Patent Owner's
19 response to them that also confirms that Ganin does indeed have two
20 machine learning algorithms. If you look at Exhibit 1013 and you pull up
21 specifically page 227 -- 226 to 227, you'll see where the European Patent
22 Office maps the same Ganin reference to the same elements of these same
23 claims. And they're saying there's two machine learning algorithms. They
24 have a clear statement at the top of page 227, remark, the joint learning of
25 the two CNNs for coarse and fine warping implies the claim to train. The

1 European Patent Office also said there are indeed two convolutional neural
2 networks, two machine learning algorithms. So, there's voluminous
3 evidence that there are indeed multiple machine learning algorithms in
4 Ganin.

5 So, I'm going to try and skip ahead to Chalom-Aslan, but I'll pause
6 there just to see if there's any more questions on Ganin.

7 JUDGE HOMERE: Yes, counselor, this is Judge Homere.
8 Regarding the limitation that the same training data be provided to modules,
9 essentially Petitioner is relying on Figure 10(a) of Ganin for that teaching?

10 MR. STEIN: In addition to the explanations provided by Patent
11 Owner's own expert and Petitioner's expert. So, both experts have
12 interpreted these figures to show that the same training data goes to both of
13 the modules. And I have -- those citations would be in our reply brief as
14 well, but I can try to point you to them here as well.

15 JUDGE HOMERE: Because I do not recall those arguments being
16 made in the opening brief in the main -- regarding those two separate, and I
17 think that was a point that we raised in the DI, in the decision to institute, we
18 indicated that, you know, it was that we didn't see any evidence on the
19 record that Ganin teaches the training data being the same training data.

20 MR. STEIN: Yeah --

21 JUDGE HOMERE: So, the other window, assuming arguing that
22 the two modules teach the -- yeah.

23 MR. STEIN: Yeah, yeah. No, I understand. So, if you look at the
24 petition and then you turn to page 14 of the petition, you'll see Figure 10(a)
25 here and you'll see -- and we have -- there's other explanations in the

1 petition. And so, I'd urge Your Honors to take a second look at that.

2 But yes, we absolutely did rely on Figure 10(a) for the disclosure
3 of the training data being provided to both modules. You'll see it's explained
4 there. Each of these warping modules warps the input image by predicting a
5 pixel flow field. You'll see that we produced Figure 10(a) there. We can
6 also look further up on page 10 of the petition, you'll see that we were
7 talking about training, and at the bottom of page 10, you'll see we have a
8 citation to Exhibit 1006, Figure 10(a). And there's multiple other citations
9 throughout the petition showing our reliance on Figure 10 and the
10 supporting, very helpful testimony from Dr. Karam explaining what that
11 Figure 10 means to a skilled artisan. So, yes, we did rely on it. We did rely
12 on it in the petition, and we think it's very dispositive here, particularly in
13 view of what their expert has said, our expert has said, and the European
14 Patent Office has said all about the same reference.

15 So, with that, I know, I don't have much time left, so I'll turn to the
16 Chalom grounds if that's okay with Your Honors. Okay. So, turning to the
17 Chalom-Aslan grounds. I'm going to jump a little bit further ahead. So, I
18 want to use my time to talk about motivation for a little bit. So, if Your
19 Honors could turn to my slide 54, please. I'd like to talk with the existence
20 of an express motivation to combine, because I think it's very compelling
21 here. There are many motivations to combine, as articulated in the petition
22 and explained in the reply brief as well, but I think the express motivation is
23 particularly compelling.

24 So, if you look at slide 54 here, you'll see we have the Chalom
25 reference and we have some of the excerpts from the reference that are

1 instructing a POSA to go and have a look for any suitable technique or
2 techniques, both for training the random forest classifier, and for
3 compressing the random forest classifier. That's Exhibit 1005 at column 14,
4 lines 62 to 67, and Exhibit 1005, column 15, lines 4 to 9.

5 So, a POSA reads Chalom is told you can use any suitable
6 technique or techniques and now we need to figure out what that means. So,
7 how do we go about doing that? Well, we asked Patent Owner's expert, if
8 you're confronted with this, being a skilled person in this art, what does it
9 mean when you're being told about this suitable compression technique? So,
10 for one part here, I asked him, and this is on slide 55, I wanted to
11 understand, because I saw that it mentions parameterized surface fitting,
12 does that mean that that's the only example of a suitable compression
13 technique? So, that would maybe mean you wouldn't go beyond Chalom?
14 He said, that's just one suitable way to do it. And then I continued, I asked
15 him, what would have been some other suitable ways? And then he said, he
16 gave other options, reduced features. So, that's another form of
17 compression. And he goes on to explain that that's not the only way to do
18 compression as taught by Chalom. There's other suitable ways.

19 Turning next to slide 56, I asked their expert again. So, where
20 would you go to figure out what the optimal compression would look like
21 and what the suitable technique or techniques might have been? And he
22 said, well, they may look at some books. But he says, go and consult the
23 literature, which exactly what our expert says, exactly what we explained in
24 the petition, that you would go, you would look at the literature and low and
25 behold, you would come and you would find the Aslan reference.

1 And now I'll turn to slide 59. On slide 59, you'll see that what
2 would a POSA find in the Aslan reference? Well, they would find this joint
3 learning technique where Aslan explains at Exhibit 1007, paragraph 44, the
4 second model can be a compressed form of the first model, and they explain
5 some advantages to that. It can be more readily deployed on computing
6 devices with limited resources. And again, I also asked Patent Owner's
7 experts to explain what this means. That's at the bottom of slide 59, Exhibit
8 1062, page 239, lines 16 to 22. So, is Aslan telling a POSITA in the pre-
9 2017 timeframe that it's joint training techniques can be used for model
10 compression? Yes.

11 So, if we put all those puzzle pieces together, what are we left
12 with? Chalom says, find some suitable techniques for compression. Their
13 expert says, go and look at the literature. That's what a POSA would do. A
14 POSA would find Aslan. There's no dispute that that's analogous art and in
15 Aslan, you would find this suitable compression technique as their own
16 expert said was the case. So again, it's a very compelling express motivation
17 to combine there, given the way that the pieces of the puzzle fit together so
18 cleanly.

19 One other --

20 JUDGE HOMERE: Counselor?

21 MR. STEIN: Yeah.

22 JUDGE HOMERE: You have nine minutes left.

23 MR. STEIN: Okay. Thank you. I want to talk for just a minute
24 about one other motivation theory that I also think is quite compelling, and
25 that was identified in the institution decision. So, starting at slide 61, this is

1 the rationale that's based on known elements performing their ordinary
2 function for predictable results, which is one of the familiar KSR rationales.
3 So, if we look at slide 61, what do we know about these known elements in
4 this particular time frame? Well, we can see from Aslan that there were
5 many types of machine learning models that were well known well before
6 this patent, before 2017. And again, this is one more thing that their expert
7 confirmed, their own expert. So, Exhibit 1062, page 216, lines 6, to (page)
8 217, line 3, I asked him, these types of machine learning models that Aslan
9 lists in paragraph 22, these were known elements to a POSITA in the pre-
10 2000 time frame? Yes. So again, we got known elements.

11 If we turn to slide 62, I also asked their expert, could a neural
12 network have been the machine learning model 100 consistent with the
13 Aslan reference? Yes. Or he said, that is what it states. Continuing, if we
14 go to page 63 and we talk about the Chalom reference as well here, we're
15 talking about the fact that Chalom and Aslan both involve known classifiers.
16 And again, this is not just us saying it, not just our expert, it's also their own
17 expert, Dr. Eli Saber. And we have the excerpt here on slide 63 where he's
18 referring to Figure 5 of Chalom, and he's explaining that this random forest
19 classifier in Chalom will do this classification task.

20 If we turn to slide 65, the same is true for Aslan. So, these known
21 elements performing this classification task, and their expert is telling us this
22 is the case. So, on slide 65, we have the quote here, does Aslan provide
23 example of a task that can be formed with the system it describes? Yeah.
24 So, Aslan states, a trained machine learning model can comprise a classifier.
25 So again, we got known machine learning algorithms. We got them

1 performing the same task, these classification tasks using these classifiers.

2 So, how do we put it all together? We put it all together with this
3 known teacher-student architecture, which is exactly what these claims are
4 doing, and which is what Aslan is teaching. If you look at slide 66, again,
5 this is an admission from their expert where he explains that it's possible --
6 or I was asking him, could it have been after 2017? It's possible that that
7 was the first time you heard about teacher-student architecture? After 2017,
8 he said no, it would have definitely been before 2017, which is no surprise
9 because Aslan is before then and Aslan teaches teacher-student architecture.
10 So again, known machine learning algorithms performing the functions that
11 their experts said they perform and being architected as this known teacher-
12 student architecture and there's nothing surprising that that's a sufficient
13 motivation. It's an alternative motivation to the express motivation that I
14 explained a moment ago.

15 And turning next to slide 60.

16 JUDGE HOMERE: Counselor? Counselor?

17 MR. STEIN: Yes.

18 JUDGE HOMERE: Counselor, this is Judge Homere. What about
19 the argument that the two references are directed to different things?
20 Specifically, Chalom is directed to correcting the gaze of a user, whereas
21 Aslan is directed to classifying the feature of the user, thereby because of the
22 fact that they have different objectives than they're not combinable. What
23 do you say about that argument?

24 MR. STEIN: Right. My first response would be that does nothing
25 to undermine the express motivation. When the base reference tells you, go

1 look for a suitable technique or technique for compression or training. It
2 says nothing of, only look for image classification art, or only look -- it just
3 says, go and find suitable compression techniques, and there's no limitation
4 on which place you should find it. So that would be my first response. It
5 doesn't undermine the express motivation.

6 The second response, yeah, it would be -- I'm going to go to my
7 other slides here because I do have a slide on this. Is that the way the pillars
8 of the argument that Patent Owner has made, and we've rebutted these piece
9 by piece in the brief as well, they fall apart when you look at what they're
10 saying. So, I'm going to go to slide -- let me find it here, just a moment.
11 Slide 93, please. So, one of the arguments that they make saying that, oh,
12 these are so different you can't combine them again -- oh, the second point I
13 wanted to make, sorry.

14 In addition to this being nothing that undermines the express
15 motivation, there's also been no dispute about analogous art. So, if this
16 argument were to have some credibility you would think that there would
17 have been an offering that somehow Aslan isn't analogous art, because if it is
18 analogous art, a POSA knows about it and just this minor difference in the
19 tasks doesn't defeat the motivations expressed earlier. So, it's both it doesn't
20 undermine express, and there's nothing in this argument that eliminates the
21 fact that these references were indeed analogous art that's not a disputed
22 issue.

23 Then third, when we look at the merits of these arguments they fall
24 apart. So, turning to slide 93, one of the arguments they make is that the
25 motion vector fields in Chalom are somehow not suitable. And you'll see

1 here that that's bolstered by some incorrect assumptions from Patent Owner's
2 expert. So, you'll see here that he says, motion vector fields are typically
3 expressed by a decimal numbers and classes and labels are usually integers.
4 So, that's the basis for his opinion that somehow classification and editing,
5 those are just so different. But that assumption is not true and he himself
6 undermined it.

7 If you look at slide 94, you'll see here that this is more admissions
8 from their expert where I asked him, are there other ways to express motion
9 vectors besides decimal numbers? You might express some with integers.
10 And then I asked him, so you could express motion vectors as integers and
11 not use interpolation? Obviously, you could do that. So, the form of these
12 things, even though he said there was this great distinction, he walked that
13 back at his deposition. This is no basis to undermine the combination.

14 And the next thing I'll point out is, and I don't have much time, but
15 I would just ask Your Honors to look at our expert's declaration, Exhibit
16 1003 at paragraph 215, where she very clearly walks through how you can
17 make use of these image classification techniques in Chalom's image editing
18 context. So, there's ample evidence in the record to explain these arguments
19 and explain why Patent Owner is simply incorrect here.

20 So, with my remaining time I wanted to make one point. I want to
21 make one point. Turning back to slide 70, please, Your Honors. One of the
22 other arguments, again, on motivation that Patent Owner presents, which
23 again falls apart when you actually look at the underlying evidence, is that
24 somehow Chalom had this perfect solution. It's not inaccurate. It's not
25 inefficient. It's just this beautiful solution that has no issues whatsoever, and

1 that's simply not true.

2 If you look at slide 31, you'll see one of the places that they cite to
3 this is in Exhibit 1005, column 9, lines 50 to 52, they say the techniques
4 discussed herein may provide for high quality eye contact correction in real
5 time. So, the thing I want to stress here is the use of the word may, the
6 permissive language. If you look at what their expert explained about that
7 permissive language, he said, and I'm referring to slide 71, but what does
8 may mean? And he explained on slide 71, we have the excerpt, it may
9 provide for high quality eye contact correction, but there may be some error.
10 This is not a perfect solution. And their expert admitted that Chalom still
11 contemplates that there's room for improvement, which is not surprising
12 because normally there is room for improvement in almost anything that
13 humans do.

14 If we turn to slide 72 and 73, I'll just briefly point out from Your
15 Honors that there's a number of these areas where they've relied on this
16 permissive language over and over again. Chalom says, its solutions may do
17 certain things, may achieve certain results, but as their expert explained,
18 errors can still be introduced. The solution is not perfect. So, the
19 motivation, again, the third alternative motivation we talked about
20 expressed, we talked about known elements, and now we're talking about
21 accuracy and efficiency. This one is also sufficient to provide a motivation
22 to make this combination.

23 With that, I'd just like to conclude. If you turn to slide 101. I'd
24 like to point out that I focused my presentation here on slide -- sorry, Claim
25 1, and on pretty much only two elements of Claim 1, because there are no

1 other disputed issues for all the other claims that have been challenged, and
2 for all the other combinations that have been raised, there are no independent
3 arguments. So, should Your Honors agree with our arguments as to Ganin,
4 or with our arguments as to Chalom and Aslan, and we think both of them
5 remain as viable as they were in the petition, then all of the claims fall
6 because there are no other arguments.

7 So, just to summarize very briefly, as to the Ganin led grounds, as I
8 explained, those arguments rely chiefly on imagined elements that are not
9 required by the claims. And I walked through those examples. They're also
10 clearly explained in our briefs.

11 And the last point is on the Chalom-Aslan led grounds, there's a
12 legally sufficient express and other motivations that remains intact and is
13 sufficient to produce this combination. And with that, I'll conclude and save
14 the rest of my time for rebuttal. Thank you.

15 JUDGE HOMERE: Okay. Thank you, counselor. It's now 1:55,
16 so you have 13 minutes left for rebuttal.

17 MR. STEIN: Okay. Thank you.

18 JUDGE HOMERE: Thank you. Patent Owner, are you ready to
19 proceed?

20 MS. MAURI: Yes, Your Honor, and may I request to reserve 15
21 minutes as well for my sur-rebuttal?

22 JUDGE HOMERE: Okay. Fifteen minutes. So, it is now 1:55.
23 You may begin whenever you're ready.

24 MS. MAURI: Thank you, Your Honors. Good afternoon. As I
25 mentioned in the beginning, my name is Jennifer Mauri, and I represent the

1 Patent Owner.

2 At its most basic level, machine learning involves an algorithm
3 that learns how to perform a task. It learns by training on a large amount of
4 sample data that represents the before and after that task. The sample before
5 and after images or input and output images are called training pairs. The
6 algorithm can learn how to instruct the system to take an unknown input and
7 create an output that closely matches those training pairs. Then the machine
8 learning algorithm can measure how well it has learned that task with the
9 error calculation called an objective function. These are basic parts of the
10 machine learning algorithm. As we'll talk about today, the '985 patent
11 relates to machine learning algorithms, and specifically, claims to machine
12 learning algorithms.

13 If I could refer to slide 2 of my presentation. The '985 patent
14 claims a first machine learning algorithm that receives training data and then
15 generates first reference data using that training data. Then the second
16 machine learning algorithm generates second reference data using the same
17 training data, first reference data that was output by the first machine
18 learning algorithm.

19 Turning to slide 3. Each of the independent --

20 JUDGE HOMERE: Counselor. Counselor, this is Judge Homere.
21 Is there a definition in the specification of the patent of what the machine
22 learning algorithm is?

23 MS. MAURI: I don't believe that it has a set definition. It would
24 rely on the definition known to a person of skill in the art.

25 JUDGE HOMERE: Does that include a module or a neural

1 network for that matter?

2 MS. MAURI: I'm sorry, if the question was if it included a neural
3 network, then yes.

4 JUDGE HOMERE: Yeah, would that include the definition? As
5 one of skill in the art would understand a machine learning algorithm, would
6 it be construed or can it be construed to include a neural network, for
7 instance?

8 MS. MAURI: Yes, Your Honor.

9 JUDGE HOMERE: Okay. And a module, can a module be a
10 neural network as well, as far as the ordinary skill in the art is concerned?

11 MS. MAURI: No. Patent Owner's position is that a module is
12 separate from a machine learning algorithm. It can be a part of a machine
13 learning algorithm. For example, in Ganin, which has two modules, but
14 those two modules are part of one bigger machine learning algorithm.

15 JUDGE HOMERE: The evidence shows that Ganin utilizes a
16 module interchangeably with a neural network. Therefore, wouldn't one
17 skilled in the art understand that each of the modules at least comprises a
18 neural network?

19 MS. MAURI: I'm sorry, could you repeat that last part of your
20 question? I apologize, my phone cut out.

21 JUDGE HOMERE: Ganin refers or uses the term module
22 interchangeably with neural network. Is that correct? This is what
23 Petitioner just showed in the evidence in Ganin.

24 MS. MAURI: No, it does not. If you look at Figure 2 of Ganin, it
25 shows the 2-scale flow neural network as containing both modules, meaning

1 both modules are within the single neural network, which would be a
2 machine learning algorithm. Counsel for Petitioner pointed about that same
3 figure where the lightness correction is shown in its own box as a neural
4 network, that also would be a machine learning algorithm. If the two
5 modules that are part of that neural network were in fact two separate
6 machine learning algorithms, they would be depicted as two different neural
7 networks. Instead, they're two modules as part of one neural network.

8 JUDGE OGDEN: Ms. Mauri, this is Judge Ogden. If you have
9 two modules together in, say in the series, and they form a neural network, a
10 single neural network, or a single machine learning algorithm, and then
11 suppose you just split them apart and use them separately, would each of
12 them be a machine learning algorithm at that point, or would they still be
13 something different?

14 MS. MAURI: Well, that was a (INDISCERNIBLE -
15 TECHNICAL DIFFICULTY) the details. As the Patent Owner explained in
16 its papers, that's the question as to whether or not Ganin discloses two
17 machine learning algorithms and goes back to the point that I made at the
18 beginning. At its most basic, a machine learning algorithm is an algorithm
19 that learns from data. You need an input and need an output to teach the
20 machine learning algorithm what it starts with and what it's supposed to
21 output. And then it measures how close it is to that via the objective
22 function. Therefore, to have a machine learning algorithm, it is inherent that
23 you need those things. Otherwise, it doesn't know what to output, doesn't
24 know how to test what its output to see how close it got to where it needs to
25 be. Ganin doesn't disclose two different sets of training data, doesn't

1 disclose two different objective functions because it's not doing two separate
2 machine learning algorithms. It's doing a single one that is stretched into
3 two pieces.

4 JUDGE HOMERE: But that doesn't matter because the claim does
5 not require two separate training data. So, I think this is a red herring at best
6 here. But at Figure 11 of Ganin, 11B specifically, they refer to that lightness
7 correction module. And they also refer to it as including a neural network.
8 Isn't the lightness correction module the equivalent to the second module in
9 Ganin?

10 MS. MAURI: Is the lightness correction the same as the second
11 module in Ganin? The second module in Ganin would be the fine coarse
12 correction module, which would not be the same as the lightness correction
13 module. They've achieved different goals. They do different things. One is
14 a fine warping module, which takes a sort of intermediary product that's
15 been coarsely adjusted and then more finely adjusted. The lightness
16 correction module is a separate module, but then corrects, for example, for
17 light and lightness.

18 JUDGE HOMERE: Well, how many modules do we have in
19 Ganin? I thought we had, I mean, we had two modules. We had the coarse
20 warping module and then the fine warping module. So now, are you saying
21 that we have an additional module, the lightness correction module, the
22 lightness correction module here, lightening module?

23 MS. MAURI: Yes. If I can refer you to my slide number 21,
24 which has the full image of Ganin's Figure 2 there for your reference. In this
25 image, as you can see, there's the far left, actually, it would be more helpful

1 if I show you slide 22, I apologize.

2 If we go to slide 22, which is a little bit of color correction here,
3 the before image is the green, that's the uncorrected eye, feeds into the
4 middle section, which is the model, which is your 2-scale flow neural
5 network depicted in the blue. And then it spits out the right after image.

6 Now, we can go back one slide to slide 21. This is the full figure
7 of Ganin. After that initial after image comes out from the 2-scale flow
8 neural network, which contains the coarse module and the light -- I'm sorry,
9 the coarse and the fine module, it then goes on to take another step to
10 address the lightness correction of the image as further processing.

11 Now, as mentioned, originally this was not part of Petitioner's
12 argument. They argued that the 2-scale flow neural network is the two
13 machine learning algorithms that is equivalent to the '985 patent. It was on
14 reply this new argument was raised about the lightness correction neural
15 network being yet another machine learning algorithm. If Petitioner's
16 position is correct, there's actually, there would be three machine learning
17 algorithms in Ganin, right? A coarse, a fine, and then a later lightness
18 correction neural network. That is not, unless I misunderstood Petitioner's
19 position, their focus is on the 2-scale flow neural network as meeting the
20 claims of the '985 patent, and the lightness correction would be additional,
21 more post-adjustment.

22 JUDGE HOMERE: Okay. Let me make sure I understand. This
23 is Judge Homere. Let me make sure I understand your position well here.
24 Essentially, based on what I'm looking at on slide 21 of your demonstratives,
25 you are saying that, yes, that depicts a system having two machine learning

1 algorithm, one being the 2-scale flow and the other one being the lightness
2 correction module, or the lightness correction neural network. Except that in
3 the petition, Petitioner did not -- that's not the case that Petitioner had made.
4 Petitioner had relied on the 2-scale flow to teach the two separate machine
5 learning algorithms. Is that your position?

6 MS. MAURI: Yes, Your Honor.

7 JUDGE HOMERE: Thank you.

8 MS. MAURI: In fact, since we're on this subject, if we can look to
9 step -- I apologize, to slide 24. What slide 24 depicts here is the sort of a
10 blow up, zoom in view of the 2-scale flow neural network, right? Directly
11 taken from Ganin, we're going to blow that up. Now, moving forward to
12 slide 25, back to this point, the blue box, again, is a larger depiction of the 2-
13 scale flow neural network that was shown on Ganin's Figure 2. The before
14 image goes in, the step one module is Ganin's first coarse step, also referred
15 to as the half-scale warping module. It then sends out the -- is a half-
16 processed intermediary product to then the Step 2 Module, which is the fine
17 step, also referred to as the original scale warping model. Then after that,
18 that it puts out the after image.

19 JUDGE BOUDREAU: Ms. Mauri, this is Judge Boudreau. That
20 half-processed intermediate product that you've inserted there, does that
21 include output from the Step 1 Module?

22 MS. MAURI: Yes. So, that intermediary product is actually
23 described in Ganin at the top of page 6 when it talks about its fine warping
24 module, which is the Step 2 Module. Okay. So, it's receiving the input data
25 concatenated with the rough image estimate and the up-sampled low-

1 resolution flow. So, the original training data that got fed into Step 1 goes
2 through Step 1, has additional things concatenated to it, so it's no longer the
3 same. It's now been changed because it's got an additional step. And then
4 that new intermediary product, that changed product with the training data
5 and the up-sampled low-resolution flow and the rough image estimate, that
6 is then what is fed into Step 2 of the module.

7 JUDGE BOUDREAU: Well, how do you reconcile that with
8 Figure 10(b) of Ganin, which additionally shows that not only is the output
9 from the first step being fed into the second step, but you're also
10 concatenating it with the original input?

11 MS. MAURI: So, if I can actually direct your attention to 10(a) in
12 Ganin, if you look at 10(a) in Ganin, you'll see the training data is
13 represented on the left side of the figure. There's a couple of boxes that then
14 fit into a triangle. The triangle represents the concatenation, right? That
15 information is sent up top. It goes upwards to the process half scale, goes
16 through that module one process. With that input data, then also as it shows,
17 goes forward where it's concatenated again with the output from the top line,
18 that process point five scale of course output. That concatenation is the
19 concatenation of the output from module one with the upcycled flow and the
20 coarse output so that second triangle, which if you look at the legend for 10
21 shows concatenation. This figure is not inconsistent. It shows those are
22 concatenated together again before going into the process one times scale
23 which is the fine step module.

24 JUDGE BOUDREAU: Ms. Mauri, thank you for correcting me; I
25 misspoke when I said Figure 10(b). I did mean Figure 10(a). But I think my

1 question is really Figure 10(a) additionally shows the input being
2 concatenated with what you're depicting here on your slide 24 as being the
3 output from the Step 1 Module, and this depiction on figure -- on slide 24
4 doesn't show that input additionally being concatenated with that output.
5 And that's the concern that I have with this argument. I'm still trying to
6 understand how there's any difference between simply having two modules
7 and having two machine learning algorithms as recited in the claims.

8 MS. MAURI: Sure. Well, the difference again is that let's say
9 hypothetically there are two machine learning algorithms. The Step 1 part
10 which is the coarse warping, and the second step which is the fine warping.
11 To have a machine learning algorithm, the machine learning algorithm has
12 to understand what it's before and after needs to look like, and a way to
13 measure how different it is from those two things when it inputs something
14 new. Right? If it's eyes are supposed to look straight forward, are they still
15 looking off to the left off to the right?

16 Ganin does not disclose a set of training data or an objective
17 function to teach -- if Module 1 were a machine learning algorithm, does it
18 have the information to teach that what that output should look like. It has
19 no way of knowing. Okay. After my course adjustment what does it look
20 like? Is it done correctly? What is my output at this point? How far is it
21 off? What is my objective function measure? Okay. It doesn't have that.
22 So, it can't determine on its own it would be a, I don't know, a part of the
23 machine learning algorithm as opposed to a whole one, because it can't learn
24 based on what information it's being fed.

25 The same would be true of the fine module. It doesn't have a

1 separate input of what the fine adjustment should look like, and it doesn't
2 have an objective function to measure what that fine input, how far it is off
3 from the fine output. Because of that, you have one set of information that
4 goes in, beginning of the machine learning algorithm, and one that comes
5 out, and those two are compared to each other to see how well it worked.
6 That inherently means it's one machine learning algorithm, even though it
7 has multiple steps, as opposed to, if it were two machine learning
8 algorithms, you'd have a set of coarse information, you'd have an output. It
9 could measure those two with the objective function and say, hey, this part's
10 working well, not working well, and some adjustments. And then forwarded
11 onto a second machine learning algorithm, could then do a fine adjustment.
12 You'd have your fine input and your fine output to measure it against.

13 JUDGE BOUDREAU: Where do we find all of those additional
14 requirements for a machine learning algorithm in claim 1 of the '985 patent?

15 MS. MAURI: These are inherent to how a machine learning
16 algorithm works, and it would have been known to a person having skill in
17 the art at the time. They're inherent to doing a machine learning algorithm,
18 that it has to have input and output to train with, and that it has to measure
19 how well it is training. Those are just inherent to a machine learning
20 algorithm.

21 JUDGE HOMERE: Counselor, this is Judge Homere. Looking at
22 Figure 10(a) here, assuming arguendo those processes are the modules, and
23 assume arguendo that the machine learning algorithm. So, essentially what
24 you have here, I'm trying to figure this out here, is you have two sets of data
25 coming in. You have the actual input, and then you have the input data, and

1 you have the angle embedded in units and everything that's going to the first
2 module machine learning algorithm here. And at the output it says, where it
3 says coarse out, that would be equivalent to the reference data that's recited
4 in the claim. Is that correct?

5 MS. MAURI: I would hesitate to say equivalent to, because it's
6 not necessarily the reference data. It's the up-sampled data and the coarse
7 output flow.

8 JUDGE HOMERE: Because in the claim the output of the first
9 machine learning algorithm is the reference data, right?

10 MS. MAURI: Yes. The first reference data.

11 JUDGE HOMERE: Yeah. And that's what's fed to the second
12 machine learning algorithm. So, if this coarse out that's come outside of this
13 first process, you know, is the output of that. I think it would be reasonable
14 to say that, okay, this coarse out here at least teaches or suggests the first
15 reference data. So, the only outstanding issue here is whether the same
16 training data that was fed to the first machine, to the first machine learning
17 algorithm, is also fed to the second machine algorithm here. Now, it seems
18 to me from this depiction in Figure 10 that the input is also provided, if you
19 look at the pink line, is also provided in the second machine algorithm. So,
20 it seems that the same input that was provided to the first machine learning
21 algorithm, or the first process, is also provided to the second process. Is that
22 correct from this depiction of Figure 10(a)?

23 MS. MAURI: No. I would respectfully disagree that it's not,
24 because if the same input data, the pink line, were going into the process one
25 scale, the second module, that second blue triangle would not be there. That

1 represents the data being changed. It is no longer the same input data that is
2 required by the claims. The claims require the same identical -- the same
3 reference data be provided -- I'm sorry, training data, excuse me, let me say
4 that again so that we're clear. That the same training data be fed into both
5 the first machine learning algorithm and the second. Here in Ganin, that
6 second blue triangle to the right side of Figure 10(a) shows it's no longer the
7 same training data. It has been changed by being concatenated with other
8 data. Then it is fed into the process one time scale as depicted in the blue
9 rectangle to the right.

10 JUDGE OGDEN: Ms. Mauri, this is Judge Ogden. I think what
11 you're saying, if I understand it correctly, is that concatenating data with
12 something else changes it so it's not the same? Is that what you're saying?

13 MS. MAURI: Yes.

14 JUDGE OGDEN: Well, but the data is still there and that
15 concatenated packet of things that you're transmitting, right? And if you
16 look at just that part of the concatenated structure, has that changed at all?

17 MS. MAURI: Well, the concatenated data obviously includes the
18 original training data. However, it's not the same anymore. It's been
19 changed. Just because we know how it got changed and what has been
20 added to it does not make it the same anymore. To use an overly simplistic
21 example, if I take \$10 and I double it and make it \$20, is that \$20 the same
22 \$10 that I started out with? I would argue that it's not, it's not the same
23 anymore. It's a different thing. The '985 patent is clear throughout its
24 disclosures through multiple of its figures that the same training data is fed
25 through, not the data concatenated with something else, not doubled, not

1 made smaller, the same data. And Ganin does not do that.

2 JUDGE OGDEN: Well, let me just change your analogy a little
3 bit. Suppose you look at it like somebody has a \$5 dollar bill and then they
4 get another \$5 dollar bill and put it next to it and hand it off to somebody.
5 Have they changed the \$5 dollar bill?

6 MS. MAURI: They've changed the -- they've changed the money.
7 If I -- if you gave me \$5 dollars and then I gave it to somebody else and I
8 gave, sorry, let me step back. If you gave me \$10 dollars and I hand you
9 back one \$5, would you think I gave you back the same amount of money?
10 I'd say, well, there's \$5 dollars as part of \$10 dollars. The smaller part of it.
11 Would that be the same? I would say it's not.

12 JUDGE OGDEN: Well, the amount of money may be different,
13 but the dollar bills themselves wouldn't have changed, right? I'm just
14 wondering if you could help me distinguish my example from what's going
15 on in Ganin.

16 MS. MAURI: Well, again, the data itself has been changed
17 because there's more additional data with it. It's not the same anymore. And
18 maybe this has come from a semantics argument of what is the '985 patent
19 mean by same? Does same mean identical or the same mean the data plus
20 more information added to it? Our position is the same means same. It
21 means identical. It can't have more, it can't have less. So, our positions is
22 that it must be the exact same data. The same single \$5 dollar bill has to be
23 handed over, not a \$5 dollar bill plus a bunch of other things that are all
24 added to it. But again, we're using an analogy that's a little bit clunky and I,
25 you know, that's on me for introducing a clunky analogy. But at the end of

1 the day, we're not talking about dollar bills. We're talking about this data
2 and data that is -- has more or less or a different amount. It's not the same
3 data anymore.

4 JUDGE HOMERE: Counsel, this is Judge Homere. I want to be
5 sure that we understand each other here. So, this concatenation that's
6 happening here, is it adding the data, or is it -- what does that mean exactly?
7 This concatenation that's happening at the first processor and in the second
8 processor. Or is it adding the input plus the other two inputs, or is it
9 essentially just combining them into one? What do you think is going on
10 here?

11 MS. MAURI: A concatenation combines them all into one. So, if
12 you had two different data sets, you concatenate them, now you have one
13 larger data set that contains all of them.

14 JUDGE HOMERE: Okay. So, in the example you gave earlier
15 regarding the \$20, so you had -- you have two \$10. Yeah, so you have one
16 \$10 and another \$10, and then you put them together, and then you
17 somehow collect them and then, you know, and submit it somewhere else.
18 So, by dint of just the next thing I want to do, the other one, your position is
19 like, you've changed the \$10. You don't have \$10 anymore. You don't have,
20 you know, the \$20 anymore because you essentially bind them -- bound
21 them together.

22 MS. MAURI: Yes, that would be the position. If I handed you
23 five \$10 bills, I'm handing you \$50 now. I'm not handing you \$10 anymore.
24 It has changed it. Well, it is, it is no longer the same as required by the '985
25 patent. The '985 patent in its claims requires it be the same. The same is not

1 the original amount plus a bunch of other data concatenated to it and added
2 to it. It is, it has to be different.

3 Also, from a linguistics perspective, if you look at Ganin, if
4 concatenation weren't really required, why would it be depicted in the
5 figure? Ganin specifically depicts the concatenation step separately than just
6 three different arrows going into the process one times scale. It shows that
7 they're concatenated, which further confirms that that is no longer the same.
8 It has been changed. Otherwise, it would just draw a straight arrow, which
9 is what the '985 patent predict -- or depicts.

10 JUDGE BOUDREAU: This is Judge Boudreau. Doesn't the claim
11 actually require that the second machine learning algorithm use both the
12 same training data and the first reference data? So, I'm trying to understand.
13 I guess going back to your analogy, if the original training data is equivalent
14 to a \$5 bill, and the first reference data is some five \$1 bills, for instance,
15 and I received both that \$5 bill and the five \$1 bills, yeah, now I have \$10,
16 but I'm still receiving the original \$5 bill as well as those five \$1 bills. And
17 I'm struggling to understand how that's different from what's required by the
18 claim here.

19 MS. MAURI: So, you are correct that the claims require that the
20 second machine learning algorithm receive the same training data and also
21 the first reference data. What it does not require or disclose is mixing that
22 training data, original training data with that first reference data before it
23 gets fed into the second machine learning algorithm.

24 JUDGE BOUDREAU: Do you understand concatenate to mean
25 mixing, or simply linking them together (INDISCERNIBLE - TECHNICAL

1 DIFFICULTY)?

2 MS. MAURI: I understand them as being additive. They add
3 together. So, it's a single concatenated set of data instead of two pieces of
4 data they're just sitting next to each other. It's a concatenate. They're added
5 together. So, it makes a larger data set from that. To perhaps change your
6 example a little, if five \$1 dollar bills are the training data and five \$1 dollar
7 bills are the first reference data and I put those altogether and then hand
8 them to you, which ones are the same training data that came before the first
9 that originally was fed into the first machine learning algorithm and then
10 also need to be fed in the second machine learning algorithm. And what is
11 the first reference data? The Patent Owner's position is that by
12 concatenating together, they're no longer the same training data. It has been
13 changed because it has been concatenated and it is that that is fed into the
14 second machine -- the second module, excuse me, the second module of
15 Ganin, and therefore it's not the same training data as required by the '985
16 claims.

17 JUDGE HOMERE: Counselor, this is Judge Homere again. Is
18 there anything in the claim that precludes the training data from being mixed
19 with something else? So, in other words, because the claim is a open-ended
20 transition phrase that says that, you know, including that the system that
21 before includes a number of things, and one of the things that's recited is the
22 training data. And so, is there anything in the claim that precludes, or in the
23 specification for that matter, that precludes the training data from being
24 appended to something else? In other words, if you had \$5 and then you
25 combine it with another \$5, you have \$10 number. You still had the original

1 \$5 plus something else in there technically. So, the question is, what is the
2 basis for this argument in the claim or in the specification of this patent
3 here?

4 MS. MAURI: The claims themselves use the language that the --
5 I'll point to Claim 1[D], for example. Using a second machine learning
6 algorithm to generate second reference data, using the same training data as
7 the first machine learning algorithm and the first reference data. So, what
8 that is saying is it's the same that is what has been fed into the first machine
9 learning algorithm. Therefore, it is the same data. That is where the
10 argument is based is it's the same data needs to be fed into both. If it is
11 changed and concatenated with other data after the first machine learning
12 algorithm anymore, it is not the same anymore. That's Patent Owner's
13 position.

14 JUDGE HOMERE: We get your argument. Counselor, you only
15 have 30 minutes left for your arguments. Do you want to move to Chalom?

16 MS. MAURI: I would please. Thank you. I appreciate it, Your
17 Honor. So, I, in recognition of my limited time, I'd like to focus on the
18 motivation to combine argument for Chalom and Aslan. And specifically --
19 so, turning to the motivation to combine, it's Patent Owner's position that
20 there was no motivation to combine Chalom with Aslan.

21 First, Chalom teaches a single machine learning algorithm for gaze
22 correction, whereas Aslan is directed to training multiple machine learning
23 algorithms in parallel. That's one of the questions is whether a person of
24 ordinary skill in the art would have looked from Chalom's single machine
25 learning algorithm to Aslan's multiple machine learning models to improve

1 that? And the answer is that they would not.

2 There are three main reasons why a person of skill in the art would
3 not have been motivated to combine a single machine learning algorithm of
4 Chalom with Aslan's multiple model training. First, Petitioner's alleged
5 motivation to combine relies on the incorrect assumption that Chalom is not
6 a limited-resource, low-power environment. Two, Petitioner alleges that the
7 motivation to combine exists because a person of skill in the art would look
8 to Aslan to make efficiency and/or accuracy gains, but that is also correct.

9 Now, before I dive into those reasons, I'd like to set some context
10 for Chalom and Aslan. For a broader view, Chalom and Aslan are trying to
11 achieve is a similar result, which is being able to get the benefit of a large
12 complex model without having consumed too many computational resources
13 at runtime. Chalom, as the institution decision addressed, explains that its
14 methods include a training component performed offline, and a real-time
15 component performed during implementation or runtime. Similarly, Aslan
16 explains that its joint training techniques are helpful in model compression,
17 which allows for the compact representations of deep machine learning
18 models that generally allocated a large amount of memory to maintain to
19 operate at runtime.

20 In other words, both Chalom and Aslan are seeking to provide a
21 way to get the benefit of a large complex model that requires more
22 computational resources. In Chalom's case, it does this by training offline
23 and Aslan's by using a teacher, but then still allow for implementation
24 around time. Chalom by its real-time component, Aslan by the student.

25 So, why does this context matter? Because when considering the

1 motivation to combine, we have to consider whether a person of ordinary
2 skill in the art would have been motivated to combine two alternate methods
3 of achieving the same goal. And it's about to address, they would not. As
4 for the first of these, Petitioner asserts that Chalom and Aslan are pertinent
5 to the problem identified in the '985 patent of high-accuracy machine
6 learning algorithms, consuming more computational resources and being
7 slower to run. Petitioner's expert, Dr. Karam, confirmed that this is their
8 position, stating in her depo that Chalom could support real-time
9 implementation given the right resources. But if you want to limit to low-
10 power and have limited resources for mobile, then you have to improve on
11 Chalom to do that. Key words there are that she admits that Chalom could
12 support real-time implementation given the right resources. And it would be
13 helpful, you can refer to slide 36 of my presentation has some of that
14 language.

15 But a person of ordinary skill in the art would not have read
16 Chalom and understood it's having the kind of problems identified by the
17 '985 and Dr. Karam, because Chalom explicitly discloses the system
18 performs perfectly well in a limited power mobile device scenario. Going
19 back to the context I explained earlier, Chalom doesn't have this problem
20 because it uses an offline training to do the heavy lifting. Chalom itself
21 confirms, as shown on slide 37, that it performs well in a limited resource
22 environment, including on a mobile device with a small battery. In other
23 words, a low-power environment. Thus, contrary to what Petitioner claims
24 are the motivations to combine, Chalom works perfectly well in a low-power
25 scenario. And these alleged deficiencies simply doesn't exist, and a person

1 of skill in the art looking at Chalom would not look to Aslan to have Chalom
2 work better in a low-resource environment.

3 JUDGE HOMERE: Counselor, this is Judge Homere. But what
4 about Chalom express indication that the RFC here can be used or the data
5 in Chalom can be compressed and essentially be performed there. And then
6 in the other reference in Aslan that, you know, will write a similar system
7 for classifiers where data can also be compressed. So, what about that? So,
8 it seems to me that Chalom expressly indicates the art doesn't mean
9 compression of the identified data. And then I would think that would -- I
10 guess the question is, wouldn't that motivate the person of skill in the art and
11 design to look to another reference that performs or that's capable of
12 performing the compression of the classified data?

13 MS. MAURI: No, because Chalom discloses using the -- that it's
14 compression would be desirable for the random force classifier aspect of it.
15 And to what I explained earlier, that part of the algorithm, the training part
16 of the algorithm, Chalom discloses using that offline where it has plenty of
17 computational power to do what it needs to do.

18 The goal and the improvement that Petitioner has suggested would
19 be on the runtime side. It may compress it so that it can run at runtime
20 faster. The combination of Chalom and Aslan doesn't make sense in that
21 context and wouldn't motivate a person of skill in the art to combine them,
22 because the teacher-student model just adds another machine learning
23 algorithm after that point. Okay. It doubles that work. It makes it less
24 efficient and less accurate because doubling the amount of work rather than
25 speeding up the runtime component, it just doubles the amount of training

1 time to then spit out really the same thing at the end. Because, again, that
2 goal is to do the same thing. Do some heavy lifting offline, not on your low-
3 resource environment and then run runtime more officially more accurately
4 with less resources. And so, a person of skill in the art would not have
5 looked to Aslan to do that.

6 Instead, if they were looking to compress the random forest
7 classifier of Chalom, there are a number of different ways they would do
8 that, and Patent Owner's expert opined to that the ways that you would
9 compress the forest would be to, for example, reduce its size, i.e., fewer
10 trees, fewer branches, to utilize the most probable trees and branches, or
11 three, to create a smaller random forest classifier for a proper gaze
12 adjustment. Not shoehorning in a whole second machine learning algorithm,
13 teacher-student structure, which just adds more complexity. That's not how
14 you compress it. It's the opposite that's making it bigger, that's making it
15 less compressed.

16 So, let's see. Turning next to on that same point of the accuracy
17 and efficiency games. There's similar no motivation to combine the teacher-
18 student model of Aslan with Chalom because, as both experts have opined,
19 there are a number of ways that you would go to approve (sic) a machine
20 learning algorithm -- to improve upon a machine learning algorithm, such
21 that it operates more with more accuracy, none of which are to add another
22 machine learning algorithm.

23 As shown on slide 39, Dr. Saber, Patent Owner's expert, opined --
24 I'm sorry, I've misspoken. Petitioner's expert, Dr. Karam, opined on at least
25 five different ways in which you would seek to improve a machine learning

1 algorithm. Running it through a different training process, restarting it with
2 different weights. Charging or tuning the hyper parameters, adding more
3 layers, et cetera, none of which are adding a machine learning algorithm.
4 And again, that makes sense. If you have a system that's functioning poorly
5 and that you want to improve upon, the solution is not to add more machine
6 learning algorithms, which are complex whole systems, that's not how you
7 fix a challenged system. You fix it by fixing the system you have, tuning it,
8 adjusting it, not by adding more complexity, which makes it less efficient
9 and more chances for it to go wrong and be less accurate at the end of the
10 day.

11 JUDGE HOMERE: Counselor, this is Judge Homere. The
12 compression offered by Aslan, is it an online process?

13 MS. MAURI: The compression part of Aslan -- I don't think Aslan
14 explicitly states whether it's offline or online, but Aslan's teacher-student
15 model, the purpose of a teacher-student model, or one of the benefits of a
16 teacher-student model is you have a teacher, which does sort of heavy
17 lifting, right? It does an extensive amount of learning. It runs through a
18 bunch of iterations. A lot of training data runs, runs, runs, runs, runs, runs so
19 that it can then give an output that feeds into a student so the student can
20 then run faster because it has learned from the teacher. The teacher will
21 almost always be more accurate than the student because it's the teacher,
22 right? The master knows more than the student. It knows more, but it
23 synthesizes its information to the student so that the student can run faster.
24 So, the teacher model --

25 JUDGE HOMERE: No, but we understand that. I mean, that's not

1 the question that I asked.

2 MS. MAURI: Oh, I apologize.

3 JUDGE HOMERE: The question is, yes, what's disclosed in
4 Aslan? Is that the -- first of all, is Aslan concerned with compressing data
5 for the classifier?

6 MS. MAURI: No, I wouldn't say that Aslan is compressing data.
7 It's providing an alternate method to have a faster -- it's an alternate method
8 to compression. The -- you would compress at the random force classifier in
9 Chalom to help the training process run faster. You compress that so that it
10 can then move forward into the runtime process faster.

11 JUDGE HOMERE: Yes.

12 MS. MAURI: Whereas the teacher model in Aslan is an
13 alternative way to make it run faster. It's not in in there itself a compression,
14 it's an alternate way in which to have the training aspect move more
15 efficiently and more faster to then feed to the runtime component, which
16 would be the student.

17 JUDGE HOMERE: Okay. So, it isn't that what you're saying
18 here, when you are using Chalom's machine learning algorithm, or you are
19 using Aslan's machine learning algorithms, the two together, they would
20 essentially accomplish similar tasks in the same time, as far as efficiency
21 goes?

22 MS. MAURI: Yes, which is why --

23 JUDGE HOMERE: So, therefore you would agree with the notion
24 that well, if you can accomplish, if you can substitute what's going on in
25 Aslan for the compression that's recited in Chalom, why would you not

1 substitute one for the other? Assuming arguendo that what's going on in
2 Aslan, you know, it's capable of happening online. Or maybe that doesn't
3 even matter.

4 MS. MAURI: There wouldn't be a reason to combine them
5 because you're not combining -- the way in which Petitioner is proposing
6 that a person of skill in the art would have combined them would be to
7 basically double, add an additional machine learning algorithm that you
8 would take Chalom's training aspect, get through the random forest
9 classifier and then duplicate that work. So, you're not simplifying, you're
10 not compressing it. It's additive. It sort of slots into the middle, if you look
11 at the diagram that they've provided.

12 And I recognize that I'm just about out of time, but if we can pull
13 up slide 41, and I'll just try to briefly hit this point. Slide 41 depicts they're
14 above and below each other, but these are the two options that Petitioner has
15 provided for the combination of Chalom and Aslan. The purple and blue in
16 and of itself would be Chalom. The purple is the train data and then would
17 feed into the right half is also disclosed in Chalom. What Petitioner is
18 suggesting is that you would basically do another round of the blue box, and
19 if you could zoom in, the blue box and the green box are identical. They're
20 just shaded differently. And what is titled teacher, and one is titled student.
21 But they're saying, repeat the process, and this doesn't make sense to take
22 two systems, both of which already disclose a way in which you get a well-
23 trained teacher to then feed on to -- sorry, a training set that is
24 computationally heavy to then be able to feed that information to a faster
25 way of doing it. That's the purpose of the random forest classifier. That's

1 that step. Right? Is that's where it takes all that hard work and then
2 compresses it down into a quicker way to get to your solution. That's what
3 Chalom teaches, which is the same as the teacher model in Aslan is also
4 teaching this heavy computational heavy kind of first chunk of step to then
5 feed it to the student.

6 So, I appreciate that I'm out of time. And so, unless the Board has
7 questions at this point, I'd like to reserve the remainder of my time for my
8 sur-rebuttal.

9 JUDGE HOMERE: So, it's currently, 2:43, so you have 12
10 minutes for your sur-rebuttal.

11 MS. MAURI: Thank you, Your Honor.

12 JUDGE HOMERE: Thank you. Counselor, are you ready for
13 your rebuttal at this point?

14 MR. STEIN: I am. Yeah. What time -- do you want to start the
15 time or?

16 JUDGE HOMERE: Okay. We want to start the time. All right.
17 So, let's see. With 2:44.

18 MR. STEIN: Okay. Thank you, Your Honor. So, thank you for
19 the good questions there, Your Honors. I'm going to just sort of crystallize a
20 few points that I heard that were very important during the discussion there.
21 So, first, I want to talk about Chalom. So, I want to take things in reverse
22 because I think that story is pretty much run to a conclusion here.

23 So, as to the motivation to combine, which has been the heart of
24 our discussion here, I'd like Your Honors to turn quickly to slide 59 of
25 Petitioner's slides. And I just heard Ms. Mauri say that Aslan is not being

1 used for compression. That cannot possibly be accepted because their expert
2 said the exact opposite. If you look at slide 59, this is an excerpt from his
3 deposition. I asked him, so is Aslan telling a POSITA in the pre-2017
4 timeframe that its joint training techniques can be used for model
5 compression? Yes. End of story. Aslan is used for model compression.
6 Chalom tells you to find suitable techniques for compression. Aslan
7 provides one. That's an express motivation to combine. It's as simple as
8 that.

9 Next, Ms. Mauri talked about these other options that could
10 potentially have been out there. That legally is irrelevant. It simply does not
11 matter. We have on slide 79 a Federal Circuit case here, In re Fulton, where
12 they said our case law does not require that a particular combination must be
13 the preferred or the most desirable combination. We simply need it to be
14 desirable and suitable. We've established that. We've established
15 motivation on many levels, and I think the conclusion there is clear. There
16 absolutely was a motivation to combine.

17 Finally, --

18 JUDGE HOMERE: Counselor,

19 MR. STEIN: Yes.

20 JUDGE HOMERE: This is Judge Homere.

21 MR. STEIN: Yes.

22 JUDGE HOMERE: What about the notion that Chalom proposes
23 to perform the compression offline? Whereas, what you have in Aslan, you
24 have something that is tantamount to compression or, you know, to
25 compression essentially, but there's no evidence that's something that would

1 be done offline. So, if you have a bigger system, a bigger, you know, two
2 machine learning algorithms in Aslan, that would make sense to the other
3 party's ordinary skill artisan that would slow down the system, that would
4 reduce the efficiency. Would you not agree with that?

5 MR. STEIN: Well, respectfully, Your Honor, I checked while that
6 was being discussed, while Ms. Mauri mentioned that. I don't see that
7 anywhere in the brief. So, to the extent that's a position that's to be
8 considered, it's not been in the briefs. It's not something we've had a chance
9 to discuss with our expert. I don't think it changes anything, but it's not in
10 the briefs anywhere. So, I would respectfully submit that it's not part of this
11 record. It's not in any of the briefs.

12 JUDGE HOMERE: No, counselor, I reviewed the brief, and I can
13 attest that it is something that was argued in Patent Owner's response
14 regarding how using, substituting Aslan's system for Chalom's that would
15 essentially burden the system and would slow it down and reduce efficiency.
16 Because if you look at the brief where the argument is made for efficiency
17 versus accuracy, that argument was made.

18 MR. STEIN: Okay. So, fair enough. If it's -- if it's under the
19 premise of accuracy or efficiency, then I'm okay to discuss it. But
20 respectfully, Your Honor, I did look for offline. That particular notion is
21 nowhere in the briefs. But on the accuracy and efficiency point first, my
22 first point would be the express motivation, the known elements. Those are
23 untouched. We only need one motivation. We have about four here. We
24 have express, we have known elements, we have accuracy, we have
25 efficiency. So again, express known elements, those remain untouched,

1 unscathed by this particular position. But turning to the question on the
2 accuracy and/or efficiency gains, again, as I explained earlier, if you look at
3 slides 72 and 73, the entire premise for these positions, Your Honor, is
4 baked into the fact that Chalom is perfect. Chalom solves all these things.
5 Chalom has everything it needs, but that language is all optional. It's all
6 permissive. And we have the examples on slides 72 and 73 of our
7 demonstrative. So, there's no reason to draw that conclusion that it works as
8 well as Patent Owner would like it to. That's not how a POSA reads it.
9 That's not even how their own expert reads it, as he confirmed at his
10 deposition.

11 And in any event, as our expert has explained, I'm turning to slide
12 80. If you look at slide 80, the experts are in agreement and we have the
13 admissions here from both of the experts that implementing Chalom in a
14 teacher-student architecture as we've proposed, bolstered by any of the
15 alternative motivation theories we provided. But again, we're talking about
16 the accuracy or efficiency alternative argument that does indeed improve
17 accuracy and efficiency for the reasons provided by their expert and our
18 expert. So, no, that does that does not undermine that alternative motivation
19 theory. And it does not even touch two of the other motivation theories that
20 I think are quite compelling.

21 So, continuing, I want to talk about Ganin and a few points that
22 were raised in the discussion with Patent Owner's counsel. So first, we
23 talked about a definition of machine learning algorithm. Again, as I said,
24 there are no claim construction issues that are -- that have been briefed here.
25 And in any event, and quite tellingly, in the District Court case, machine

1 learning algorithm was a term that was briefed, that was discussed, that
2 Patent Owner had a chance to try to define in the manner that I thought was
3 appropriate. So, Ms. Mauri's suggestion that there's some inherent
4 requirement on machine learning for an objective function or anything else
5 is completely untrue in view of its own positions taken in the District Court
6 case.

7 If you go to slide 23, you'll see their definition from the District
8 Court briefing, Exhibit 1055. They said, machine learning algorithm, an
9 algorithm that is able to learn from data. That's it. Nothing else required.
10 Nothing about objective function. Nothing about training data. They're
11 imposing requirements that do not exist in these claims that they did not
12 even try to put on the claims in the District Court case. That argument has
13 no merit.

14 Next, I want to turn to a point that Judge Boudreau, I think, quite
15 keenly appreciated. And this is something I was trying to raise earlier, and I
16 just want to make sure it's been appreciated. But these distinctions that are
17 being raised, as I just said, definitionally, it's not something that's a matter of
18 claims construction. And even when claim construction was in dispute, it's
19 not something that Patent Owner tried to put on the definition of the machine
20 learning algorithm. So, when we're talking about training data, when we're
21 talking about objective function, as far as the claims require, all of that you
22 see in Patent Owner's brief, and as discussed in our responsive brief, it's
23 untethered from the claim language. Those requirements simply do not
24 exist, and they don't move the needle on the fact that Ganin does indeed
25 anticipate these claims.

1 Turning next, I want Your Honors to pull up slide 24 in Patent
2 Owner's demonstratives, please. And I think Your Honors appreciated this,
3 but I just want to make very clear that what you see here that was discussed
4 by Patent Owner's counsel, this blue box, that is not in Ganin. That is
5 something that they made up and it's not something that's tethered to the
6 disclosures in Ganin. And again, it's not tethered to the claim language
7 either. So, for multiple different reasons, it again, it doesn't change the fact
8 that Ganin has everything that these claims actually require.

9 So, and one other point I'd like to make is about the 2-scale flow
10 neural network in Ganin. I heard Ms. Mauri make the point that, oh, in
11 Figure 2, there's one box with a neural network and another box with a
12 neural network. I do want to make very clear, as I said, I think in response
13 to Judge Ogden's question in my opening, we did not rely on the lightness
14 correction neural network. That's accurate. We did rely on the coarse and
15 fine warping modules in the 2-scale flow neural network. It is of no
16 significance that Figure 2 shows it in one box.

17 What is significant is if you look at Figure 10 of Ganin and you
18 look at the fact that both of those modules have convolutional layers, that
19 tells you these are machine learning algorithms. There's nothing in the
20 claims. There's nothing in the patent that says, you know, one box means
21 there's only one machine learning algorithm. But what you do know is when
22 you have convolutional layers, you have the same training data, you have the
23 reference data being passed to these warping modules, as I explained in my
24 opening, that's sufficient to teach these claims. Nothing further is required.
25 That's it.

1 And the final point I'd like to make there is I have not seen in the
2 briefing. I have not heard here today, I've never heard Patent Owner's
3 counsel discuss the European prosecution at all. And I think it is quite
4 compelling. If you look at Exhibit 1013, which I pointed to in my opening
5 at pages 226 to 227, it's very clear that that examiner in the European Patent
6 Office took a clear position that Patent Owner did not rebut with any of
7 these untethered arguments it's made today, because simply put, Ganin has
8 two machine learning algorithms. As the European Patent Office said in
9 Exhibit 1013, page 227, it has two convolutional neural networks. That's
10 what it has. That was never rebutted, and that should be held against Patent
11 Owner as well.

12 Further, I want to make one point about the discussion of
13 concatenating. As you can see in Figure 10(a), and as I think Judge
14 Boudreau pointed out quite keenly as well, the input maps, even though
15 they're concatenated, they're being provided to both of these modules. And
16 if you look at the briefing again, I did hear the position that concatenation
17 somehow changes the inputs. That's never been briefed. That's not in the
18 arguments. There's no argument that concatenation somehow changes the
19 training data, which isn't true anyways, but that's not an argument that Patent
20 Owner has made in its brief. It's a new argument here today. It doesn't have
21 any merit, but it's not in the briefs anyways.

22 Judge Homere, you had made the point that the same training data,
23 it is there. So, you were asking about that same training data, and I direct
24 Your Honors to our reply brief at page 6, and I want to point to one aspect of
25 the discussion with Patent Owner's own expert again. So, on page 6 of our

1 reply brief, you'll see Exhibit 1061, page 176, lines 4 to 20. I was discussing
2 with him Figure 10(c) and Figure 10(a) of the Ganin reference, and he said,
3 this is what he said, and it receives as input, as you see, the output from the
4 concatenation, so that's essentially your input maps. And it also receives as
5 input the coarse flow that you see there in the coarse flow box. So, you see
6 two boxes going in that one, going in 10(c), you have the input maps, and
7 you have the coarse flow. There's nothing there that concatenation somehow
8 changes the underlying data. That's not tethered to the record, and that's not
9 an argument that Your Honors should give any credibility. It's not even
10 consistent with their own expert's testimony.

11 So, with that, I'll submit my case, and I appreciate your time, Your
12 Honors.

13 JUDGE BOUDREAU: Mr. Stein, I just want to -- this is Judge
14 Boudreau. I just want to drill down on that last point that you just made.
15 So, are you saying that there are actually three inputs to the second
16 algorithm, the output from the first algorithm, the coarse flow, and the
17 original input?

18 MR. STEIN: Which figure, Judge Boudreau, are you looking for?

19 JUDGE BOUDREAU: I'm looking at Figure 10(a).

20 MR. STEIN: 10(a).

21 JUDGE BOUDREAU: Yeah, it sounded like as though you
22 were -- and the figure does show coarse out, coarse flow, and then the input
23 data is being concatenated with the with the coarse out.

24 MR. STEIN: Yeah. So, there's input maps concatenated with the
25 coarse output and there's a coarse flow. So, there's a concatenated input

1 which is the original training data and the coarse output, and separately
2 there's the coarse flow. So, there's two sort of streams of data but one of
3 them, the concatenated input, includes two different things. And again,
4 there's nothing in the record that says concatenation changes the training
5 data. That's never been argued.

6 JUDGE BOUDREAU: Okay. I just want to make sure I
7 understand you. Are you mapping the coarse flow to some aspect of the
8 claim as well or is that just the frame source?

9 MR. STEIN: The coarse flow is the reference data. And then the
10 training data is provided through the input map. So, yes, we did map that to
11 something in the claim. So, the training data comes through the
12 concatenated input and the coarse flow is the reference data from the first
13 machine learning algorithm in Ganin.

14 JUDGE BOUDREAU: And what does the coarse out in Figure
15 10(a) correspond to?

16 MR. STEIN: I'd have to check our expert's declaration, Your
17 Honor, but I think she did discuss that. I don't -- I can't answer it offhand
18 because I don't recall exactly. But I'm confident that she had some
19 discussion of that in her declaration. And I'd be happy to look it up if I'm
20 given more time, but I see that I'm over my time already.

21 JUDGE BOUDREAU: All right. I think I understand your
22 position.

23 MR. STEIN: Okay.

24 JUDGE BOUDREAU: Thank you.

25 JUDGE HOMERE: Thank you, counselor. Counsel for Patent

1 Owner, are you ready to make your sur-rebuttal?

2 MS. MAURI: Yes, sir.

3 JUDGE HOMERE: You have 13 minutes -- 12 minutes.

4 MS. MAURI: Thank you. I'd actually like to speak to the point
5 that Your Honors were discussing with my fellow attorney here. Speaking
6 about Ganin's three inputs. As Petitioner just explained, looking at Figure
7 10(a) again, that the coarse flow is the reference data. And then the input is
8 concatenated. It's two different things. Going back to the earlier point, that's
9 exactly the point. It's no longer the same training data. It has been
10 concatenated. It is two different things. It's not the training data and the
11 reference data, which apparently is the coarse flow is the reference data. It's
12 a third thing. There are three things being said. The '985 has two, the '985
13 patent requires it to be the same training data be fed into two. Here again,
14 and does not receive the same training data. It has been changed because it's
15 concatenated with something else. Therefore, it's not the same thing.

16 I'd also like to respond to a couple of points that Petitioner made
17 that are --

18 JUDGE BOUDREAU: Ms. Mauri, before you go on, does Claim
19 1 actually exclude the use of a third data source by the second machine
20 learning algorithm?

21 MS. MAURI: No, it does not exclude it. It does not say only that.
22 It does say -- it doesn't say only, and so there could be a third
23 (INDISCERNIBLE - TECHNICAL DIFFICULTY) being inputted. The key
24 is that the training data be the same.

25 That being said, throughout the disclosure and through all of the

1 figures in the '985 patent, it's very clear that the second machine learning
2 algorithm receives two inputs, which are the training data and the first
3 reference data.

4 JUDGE BOUDREAU: So, your argument is still simply that the
5 concatenation step changes the input data so that it's not the same data
6 anymore?

7 MS. MAURI: Correct. It's not the same data anymore. I'm not
8 trying to suggest that it changes the actual underlying data itself, but that the
9 same data cannot be, you know, it has been changed, right, having things
10 concatenated to it. It's not the same anymore. It's been changed. Again, I --

11 JUDGE BOUDREAU: Can you address Mr. Stein's point that this
12 is an argument that wasn't made anywhere in the briefs?

13 MS. MAURI: This -- the argument about that, that changing the
14 same data has not been provided is throughout the briefs. Let's see.

15 JUDGE BOUDREAU: Specifically, that the concatenation
16 changes the data such that it's no longer the same data.

17 MS. MAURI: That is part of the argument of being a half-
18 processed intermediary product, which cites to Ganin's disclosure of the fine
19 warping data, which is where that language comes from. So, that was
20 addressed in Dr. Saber's declaration and in the briefs. What I'm making my
21 argument about that, what Module 1 passes on with that blue Figure I
22 showed earlier, showing the Module 1 on the left, and then pointing to a
23 half-processed intermediary product, that half-processed intermediary
24 product is referring to the data that's been concatenated with the other things,
25 which is what Ganin states on page 6.

1 If I may respond to a couple of points that Petitioner made, which
2 I -- are sort of red herrings and of little moment, one of which is whatever
3 comments were made before the European Patent Office, those are not, other
4 than complaining about us taking different positions now versus then, if the
5 issue of Ganin being two machine learning algorithms, we dispute. It's been
6 thoroughly disputed in our papers and here today, and the European
7 prosecution history of a related patent is not at issue here today. We're
8 talking about the '985.

9 And as to Petitioner taking the position that the claim construction
10 arguments in a District Court case related to this patent don't talk about
11 objective function, and therefore it must not be required for a machine
12 learning algorithm. That's an oversimplification of a purpose of claim
13 construction. The goal of claim construction is not to identify every possible
14 inherent thing that can come with a machine learning algorithm. It's similar
15 even to say and it's written in source code or that it's in C++ versus Python.
16 It doesn't say that either but that doesn't mean that it's not a software written
17 code. It is inherent in what a machine learning algorithm is. So, the fact that
18 the District Court definition did not include training data, objective function,
19 et cetera, is a red herring as to whether or not those things are inherent in a
20 machine learning algorithm.

21 As to Petitioner's point about Chalom not having to be perfect and
22 using the word it may. No one is saying Chalom is perfect. Perfect is not
23 the standard, and I recognize that there's a general desire to improve upon
24 things, but that's not the standard for motivation to combine. Their
25 motivation to combine is well, could it somehow be better, even though it's

1 telling me it's perfectly fine, because that's what Ganin does. It says I work
2 perfectly fine this way. You don't need to look to some other way to
3 improve upon me. The only way that it mentions the Petitioner is pointing
4 to is this argument that the random forest classifier could be compressed as a
5 way to improve upon it. But as I already addressed earlier, you would not
6 look to adding a teacher-student model to do the compression of a random
7 forest classifier. To do that, you would change the random forest classifier.
8 You'd have fewer trees, you know, adjust it to be more accurate, those kind
9 of things. You wouldn't add a whole additional machine learning algorithm
10 set up to do that compression.

11 And I -- in sum, going back to what we've talked about today, as
12 set forth in the papers, the '985 patent requires four things, and those four
13 things are required throughout. It needs two machine learning algorithms,
14 which Ganin does not have, and therefore, Ganin cannot anticipate that
15 machine learning algorithms 1 and 2 both receive the same training data,
16 which I've already argued is not present in Ganin, that the second machine
17 learning algorithm receives the first reference data, and that that first
18 reference data is not the same as the second reference data. The parties did
19 not get into that in the oral argument today, but that is addressed in the
20 papers.

21 The combination of Chalom and Aslan as set forth in the papers,
22 there's a couple reasons why it doesn't work on a technical basis which we
23 did not have time to get into today, but and so I won't address that. I ask the
24 Board look again at the papers to address those couple of points. The key
25 point about Chalom and Aslan here today that we've talked about is the

1 motivation to combine. And as I've already explained, there wouldn't have
2 been a motivation to combine because the parts of the -- the parts of Chalom
3 and Aslan that Petitioner suggests combining to get this added accuracy or
4 added efficiency are both covered by Chalom and Aslan's I'll say offline for
5 Chalom, or in the teacher aspect of Aslan, which is the heavier lifting one,
6 they disclose the same thing and are trying to get to the same end result.
7 Taking a heavy learning process, heavy computational power required, find
8 a way to cut that off. In Chalom's case, we have random forest classifier. In
9 Aslan's case, that would be a student to then be able to run faster at runtime,
10 right, separate it out through the heavy lifting. A person of skill in the art
11 would not look to combine two different ways of getting to the same place in
12 the way the Petitioner has suggested, and therefore, Chalom and Aslan do
13 not make the '985 patents claims obvious.

14 Very briefly, a number of dependent claims were at issue here
15 today. However, all of those rely on the same basis, even though Ganin is
16 anticipatory, which we dispute, or that Chalom and Aslan create an
17 obviousness bar. We similarly dispute that, and so I'm not going to waste
18 the Board's time on the dependent claims.

19 And with that, I will end my presentation and thank the Board very
20 much for your time. I appreciate all of your insightful questions.

21 JUDGE HOMERE: Thank you very much. Thank you for
22 appearing and for answering our questions today. I'd like to know whether
23 the court reporter has any question for the panel, for the attorneys?

24 COURT REPORTER: Yes. Actually, only one question for Ms.
25 Mauri. Counsel, the other attorney appearing with you, not attorney Gorry,

1 the other attorney that you said was on the line with you, if you could please
2 go ahead and state and spell his name, or his or her name one more time for
3 me.

4 MS. MAURI: Yes, I apologize for that. I actually don't know if he
5 was able to join, but his name is Aaron, A-A-R-O-N. Last name is Plesset,
6 P-L-E-S-S-E-T.

7 COURT REPORTER: Okay. There is one more, really. There
8 was one more. Okay. And Mr. Stein, if you could go ahead and with your
9 appearances, I know you had Mr. Walker on with you, and you said, Mr.
10 Devkar might appear. Was there -- I believe there was one more you said
11 you might have log in?

12 MR. STEIN: No, only those two, Mr. Walker and Mr. Devkar.
13 No one else.

14 COURT REPORTER: I thought I was missing somebody. So, I
15 want to make sure I want to get everyone. All right. Great.

16 MR. STEIN: Yeah, thanks for checking. I think you had everyone
17 though, thank you.

18 COURT REPORTER: Perfect. Thank you so much. Everyone
19 have a great weekend.

20 MR. STEIN: Thank you. Thank you, Your Honors.

21 MS. MAURI: Thank you, Your Honors. I appreciate that.

22 JUDGE HOMERE: Thank you again. And the hearing in
23 IPR2023-01046 is concluded. We are adjourned.

24 MS. MAURI: Thank you.

25 (Whereupon the above-entitled matter went off the record at 3:07 p.m.)

IPR2023-01046
Patent 10,740,985 B2

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